Montgomery County Public Schools Facilities Guide
DIVISION 15 – MECHANICAL

SECTION 15200 - PLUMBING SYSTEMS

PART 1 – GENERAL

1.1 SCOPE: This section consists of providing the waste, vent and sanitary sewer system, domestic cold and hot water supply system and all fixtures, equipment, accessories and appurtenances.

1.2 PERMITS, CODES & STANDARDS:

A. Plumbing systems shall be designed in compliance with all codes and standards as cited previously. Comply with all WSSC plumbing and gas fitting regulations.

B. Permits will be obtained and fees paid by Montgomery County Public Schools. The contractor shall transfer the permits, pay only the transfer fee and comply with all WSSC regulations.

C. Comply with City of Rockville plumbing and gas fitting regulations for city located projects.

1.3 SUBMITTALS:

A. GAS SERVICE:

1. At the Design Development phase, design engineer shall verify with the gas providing utility that sufficient gas service is available for the project.

2. Design engineer shall submit gas service request to the providing utility. Some projects may be serviced by Baltimore Gas; the majority are served by Washington Gas Co. Service request shall be issued at the 95% complete construction document phase, copying the MCPS Project Manager. Service request to Washington Gas shall be made on their Commercial Service Request Form, addressed to:

Sales Rep. – Montgomery County
6801 Industrial Road
Springfield, VA 22151
Room 202K

B. PLUMBING PERMIT DRAWINGS:

1. At the 95% design completion submission, two (2) complete sets of plumbing drawing shall be provided to the MCPS Project Manager, stamped and signed by the design team's plumbing professional engineer. MCPS will submit the stamped drawings to WSSC for review and approval. WSSC review comments shall be addressed and incorporated into the 100% completed (bid) documents. MCPS will provide the WSSC approved drawings to the plumbing contractor.

2. Two (2) stamped and signed civil site utilities plans are also to be provided to the MCPS Project Manager at the 95% design completion submission for the permit review submission to WSSC.

C. LEED: Require that the contractor:

1. Submit MSDS or product data for each field-applied adhesive or sealant used, highlighting VOC and formaldehyde content.

2. Submit certified water usage rating for each plumbing fixture. The target ratings shall be indicated on the Construction Documents under the fixture schedule.

PART 2 – PRODUCTS

2.1 DRAINAGE, WASTE AND VENT PIPE AND FITTINGS:

A. Above Grade:

1. Allowable piping consists of the following: Copper tubing type DWV, schedule 40 PVC, or hubless cast iron pipe; Corresponding fittings shall be wrought copper, schedule 40 PVC, or no-hub cast iron. PVC cannot be used in plenum ceiling cavities.

2. All exposed or semi-exposed waste piping in kitchens to be type L copper DWV
3. Foam core piping not allowed
4. Piping sealants, adhesives and welding cements field-applied in the interior of the building shall comply with the following VOC content limits (in grams/ liter):
    a. PVC Welding: 510
    b. CPVC Welding: 490
    c. ABS Welding: 400
    d. Plastic Cement Welding: 350
    e. Adhesive Primer for Plastic: 650
    f. All Other Welding & Installation Adhesive and Sealants: 250
    g. Specify that “All Weather” welding cement be used on plastic piping when outdoor air temperatures are below 40°F.

B. Below Grade: Service weight cast iron, hub and spigot or Schedule 40 PVC pipe. Fittings to match piping.

2.2 GAS PIPE AND FITTINGS: Schedule 40 steel pipe; threaded malleable iron fittings for piping 2” and smaller. Weld fittings shall be utilized for piping 2-1/2” and larger.

2.3 DOMESTIC WATER PIPING, VALVES, AND ACCESSORIES

A. Above Grade: Copper tubing, hard drawn, type L; wrought copper fittings, solder joint

B. Below Grade:
1. Piping, 2-1/2" and smaller, type K
2. Piping, 3" and larger, ductile-iron
3. Pipe fittings: Cast bronze flared for K tubing; gasket and bolted flanges for ductile-iron

C. Dielectric connections: dielectric flanges, couplings, or nipples. Dielectric unions prohibited.

D. Valves: Ball or globe. Gate valves prohibited except for OS&Y type required for incoming water service.

2.4 ACID RESISTANT PIPING AND ACCESSORIES

A. Above/Below Grade: Polypropylene tubing, connections shall be mechanical joints or electrofusion systems; CPVC Type IV Grade I compounds with a minimum cell classification of 23447, pipe and fittings shall conform to ASTM F2618 and solvent cement shall be formulated for chemical waste and confirm to ASTM F493

B. Neutralization: Means of neutralization shall be performed passively through a centralized polypropylene tank or through individual sink mounted basins. Limestone chips shall used for the neutralization/dilution process.

2.5 PLUMBING FIXTURES:

A. General: Plumbing fixtures shall be of manufacturers listed; fixtures, fittings, trim and accessories shall be same manufacturers to the extent possible.
1. Vitreous China Fixtures: American Standard, Kohler, Zurn, Crane
2. Stainless Steel Fixtures: Just, Eljer, Kohler, Elkay
3. Enameled Cast Iron: American Standard, Kohler, Zurn
4. Faucets: T&S Brass, Chicago, Symmons, Delta, American Standard, Zurn, Speakman, Moen
5. Flush Valves: Sloan, Zurn, Speakman, Moen
6. Emergency Fixtures: Bradley, Speakman, Guardian, Haws

B. Fixtures Basis of Design:

1. Water Closets: All shall be white vitreous china, floor mounted; no wall mounted water closets.
   a. Standard: Elongated bowl, siphon jet, NPS 1-1/2” (DN 40) top spud, 2-1/4” passageway, floor mounted, 1.6 gpf, heavy duty solid plastic open front seat less cover with S.S. hinge posts with combination self-sustaining and check hinge, dual-flush valve (1.6/1.1 gpf).
   b. ADA/Child: Reference above standard, mounted per Table 3.1 B
   c. Tank Type: Tank types shall not be used.
   d. Flush Valves:
      1) Single action valves shall be 1.6 gpf.
      2) Two-stage “dual-flush” valves shall be 1.6/1.1 gpf.
   e. Mounting: Water closets shall be secured with two bolts attaching to the floor flanges and the base shall be sealed to the floor using a clear silicone caulk. Secure with bolt caps.
2. Urinals:
   a. Wall hung, white vitreous china, 0.125 gpf, top spud, rear outlet; washdown action, flush valve.
   b. Waterless urinals are not acceptable at this time.
   c. Carriers: Wall-mounted carrier shall have top and bottom support plates, anchored to floor with foot supports.
3. Lavatories: White vitreous china, wall hung.
   a. Standard: Rectangular (20 x 18), front overflow, 4" centerset 0.5 gallon-per-minute faucet, grid strainer, wall mounted. Theft protected aerators in middle and high schools
   b. Kindergarten: Rectangular (21.25 x 18), front overflow,(grid strainer, 4" centerset 0.5 gallon-per-minute faucet, wall mounted.
   c. Supplies shall be 1/2” copper to faucet, loose key stops, 1-1/2” x 1-1/4” cast brass P-trap with clean-out and threaded outlet.
   d. All public lavatories shall receive a tempering valve conforming to latest ASSE 1070 requirements.
4. Sinks:
   a. Classroom Countertop: Stainless steel, single compartment, with seamless radius-coved corners, 3-hole ledge for faucet, 8” faucet centers, 5-1/2” deep, limited swing gooseneck faucet, wrist blade handles, duo strainer. Offset drain to comply with ADA requirements as necessary.
      1) Supplies and trap per lavatories above.
      2) Drinking bubblers shall be provided on all handicapped sinks and on all elementary school sinks.
      3) Art room sinks shall have plaster traps (1.5 x 1.5) IPS outlet, cast-brass, ground joint, swivel type, with cleanout, complete with NPS 1.5 cast-brass nipple and cast set-screw escutcheon.
   b. Mop: Pre-cast terrazzo basin (24 x 3), 18-gage; wall mounted faucet with 3/4” hose thread, vacuum breaker, integral stops, wall brace, pail hook, hose and hose bracket, strainer (1453-BB); stainless steel edge curbs and wall guards.
   c. Service: Enameled cast iron with rim guard and wall hanger. Heritage 8341.075 faucet, trap standard. Provide a double sink in concession stands.
5. Showers:

a. Group: Concealed metering shower valve with 30 second cycle or better (Leonard LV-477B), H-06 shower head; Leonard Group Shower Control (TM-186 series) thermostatic mixing valve in locking recessed stainless steel cabinet.

b. Group, Barrier Free: Concealed metering shower valve with 30 second cycle or better (Leonard LV-477B); 501P(G) hand held shower, 69" chrome hose and rail; Leonard Group Shower Control (TM-186 series) thermostatic mixing valve in locking recessed stainless steel cabinet.

c. Staff, Barrier Free: Floor and enclosure by General Contractor. Leonard 4500-S-501P(G) temp/pressure balancing valve, fixed shower head and hand held shower, 69" chrome hose and rail.

d. Free stand-in showers will not be allowed.

6. Water Coolers: Dual, two level; Elkay, Ebco, Haws, Halsey-Taylor, Oasis; HFC-134a refrigerant; barrier free, certified lead free, manual control. Support framing shall be made of heavy gauge galvanized steel with pre-punched mounting holes and mounted to the floor.

7. Emergency Fixtures: Combination shower and eye/face wash unit shall be installed for each science classroom. Shower shall operate utilizing a pull rod and eye/face wash shall utilize highly visible push handle. Comply with ANSI Standard Z358.1 by providing uninterruptible supply of flushing fluid at a minimum of 30 PSI flowing pressure. Per ANSI Standards and Code requirements water temperature provided to emergency equipment shall be tepid. Provide floor drain at the base of each shower fixture.

2.6 SPECIALTIES:

A. Traps: All traps for lavatories, electric water coolers, classroom sinks, etc. shall be cast brass, with cleanout and threaded outlet.

B. Thermostatic Mixing Valves: Lawler, Leonard model to match flow requirement.

C. Wall Hydrants: Freezeless, male hose thread, vacuum breaker, backflow preventer, loose key stop, chrome. Josam Series 71050; Jay R. Smith, Zurn.

D. Hose Bibbs:

1. Cold Water: Male hose thread, vacuum breaker, backflow preventer, loose key stop, chrome.

2. Hot and Cold Water: Two handle mixing faucet with lever handles, male hose thread, vacuum breaker, backflow preventer, loose key stop, chrome.

E. Open Site Drains: Floor drain with funnel. Josam Series #30000-E2, J.R. Smith, Zurn.

F. Floor Sinks: Josam Series #49000, J.R. Smith, Zurn. Install 1" AFF.

G. Roof Drains: Josam Series #21000-T with threaded outlet and drain receiver, J.R. Smith, Zurn.

H. Clean Outs: Josam, J.R. Smith , Zurn

1. Floor: Satin Nikolay Finish

2. Wall: Stainless steel access cover . Distance between wall cover and cleanout shall not exceed 4".

3. Exterior: Satin Nikolay Finish

I. Backflow Preventers: Comply with WSSC

J. Trench Drains: Install trench drains in each trash room as indicated on Architectural documents. Cast-iron rectangular sectional body with 6" wide cast-iron grate meeting ADA requirements. Josam Series 76000. Install 1/8" screen over drain outlet.

H. Shock Absorbers (water hammer arresters): stainless-steel bellows type, certified in accordance with PDI WH 201, Water Hammer Arresters, equal to Zurn "Shoktrol" Z-1700.

2.7 HOT WATER HEATERS: Gas fired storage type, manufactured by PVI, A.O. Smith, or STATE: ASME approved 125 gallon capacity for elementary schools and 2-250 gallons for middle and high schools. Electroless Nickel or approved equal tank lining with 10 year minimum warranty. LEED required high

efficiency schools: minimum 94% Thermal efficiency, vertical tube storage type with (2) 3" cleanouts. Standard high efficiency schools: minimum 83% thermal efficiency, removable heat exchanger, rear module access.

2.8 INSULATION: Fiberglass with all service jacket. Flexible elastomeric insulation may be used for piping drops within partitions. All joints to be properly sealed and inspected.

2.9 IDENTIFICATION:

A. Valves Tags: Brass circular tag with chain to identify system and valve number.

B. Where valves, equipment, pumps, etc. are concealed above ceilings provide plastic labels on grid below. Labels shall be black with white letters and should be the size of the grid tee. Label shall be provided with adhesive backing for attachment. Label shall indicate the tagging information and system.

C. Valve tag chart shall be provided and mounted in the boiler or mechanical room. Chart shall be laminated and framed.

PART 3 – EXECUTION

3.1 FIXTURE REQUIREMENTS:

A. Number of plumbing fixtures required: Reference International Plumbing Code for all code requirements related to plumbing fixture type and quantities. Student occupancy load shall be based on project specific educational specifications. Elementary classrooms with individual restrooms shall deduct 25 students per classroom from the overall occupancy load. Use the following list as a guide for minimum requirements:

	Fixture	Gender	Use Multiplier	# Fixture
(1) Students*	Water closet	M	.5	1 per 20
	Water closet	F	.75	1 per 20
	Secondary - Shower	M	.5	1 per 25
	Secondary - Shower	F	.5	1 per 25
	Lavatories	Both	-	50% of WC count
	Drinking Fountain	Both	-	1 per 100
(2) Staff*	Water closet	M	.5	1 per 25
	Water closet	F	.5	1 per 25
	Lavatories	Both	-	1 per 25
(3) Assembly Area*	Water closet	M	.5	1 per 50
	Water closet	F	.75	1 per 50
	Lavatories	Both		.5X # of Water closet
	Drinking Fountain	Both		1 per 500
*NOTES:	1. At least one of each fixture per bathroom shall be for handicapped use. 2. Urinal fixture count shall be included in water closets but not to exceed 50%. 3. Drinking fountain count based on total census 4. Provide at minimum (1) service sink per floor 5. Restrooms for public use shall be clearly identified. 6. Provide 1 shower per 0.5% of full-time staff to satisfy LEED requirements for Site Credit 4.2. – PE Staff Showers can be used to comply with this credit if easy access is provided and school has policy that allows all staff to use the PE showers.			

B. Fixture mounting heights: Standard primary and secondary school height of fixtures:*

Fixture	K	1 thru 3	4 thru 5	Middle School	High School	Adult
Lavatories	24"	28"	28"	31"	31"	31"
Water Closet	15"	15"	15"	15"	15"	15"
Urinals	16"	16"	16"	24"	24”	24”
Lavatories (Handicap)	24"	28"	28"	34"	34"	34"
Water Closet (Handicap)	15"	15"	15"	15"	16.5 - 17"	16.5 - 17"
Urinals (Handicap)	16"	16"	16"	16"	16"	16"
Electric Water Cooler (EWC)	25"	31"	31"	31"	31"	31"
E.W.C. (Handicap)	28"	34"	34"	34"	34"	34"

NOTES:
1. Heights are to rim for water closets and to lip for lavatories AFF
2. Pre-K Water Closets shall be 10” in height.

3.2 DRAINAGE:

A. Provide lead flashing for vent lines. Extend minimum of 12" above roof. Do not locate vent lines within 25 feet of ventilation air intakes and comply with Ventilation Rate Procedures of ASHRAE Standard 62.1. If discrepancy exists follow whichever is more stringent.

B. Roof drains must have secondary overflow drainage; water dam shall extend 3” above roof. Downspout nozzles for overflow piping to have stainless steel screens.

C. Use cast iron square boots down spouts

D. Require pipe hanger at piping connect to roof drains. Hanger shall be located directly adjacent to 90 degree bend.

E. Provide a oil monitoring sump pump in all elevator pits. Pump controller shall be mounted in nearest mechanical or building service space. Unit shall be Stancor SE-50 or equal.

F. Specify that “All Weather” welding cement be used on plastic piping when outdoor air temperatures are below 40°F.

G. Existing:

1. All existing to remain underground utilities are the general contractor’s responsibility to minimize disruption and maintain designed functionality.

2. In general, all existing sewer and storm drain lines should be replaced in full modernization projects. If MCPS directs the A/E to maintain existing drain line in some modernization and addition projects, the following paragraph shall be placed on the plumbing drawings:

> Prior to starting any work; the contractor shall test and accept all roof drains, sewer and storm drains as free flowing and in working condition. Testing shall be performed in the presence of MCPS maintenance personnel and MCPS Plumbing Inspector.

H. The contractor shall take full responsibility for protecting all drains during the construction and returning them free flowing and in working condition. Contractor shall guarantee all drains for at least 90 days after occupation of the building.

I. Floor Drains, Cleanouts:

1. Floor drains and cleanouts are to be installed prior to concrete floor pours.

2. Trap primers:
    a. Provided from flush valves where possible
    b. Provided with time clock control when not from flush valve. Assure coordination with electrical (Div 16) regarding power to trap primers.
    c. Trap priming piping to be reinforced copper tubing; no PVC

J. Waste Disposals: Waste disposals are prohibited.

3.3 DOMESTIC WATER:

A. Sterilization: Domestic water to be disinfected by a certified water-treatment company. A letter of certificate must be submitted to the owner, before building is occupied.

B. If outdoor play-fields are provided with sprinkler system, require a registered submeter to exempt the water usage from sewage charges.

C. Provide a pressure regulator in the incoming water after the backflow preventer on incoming water service when pressure may exceed 60 psig at fixtures.

D. Domestic circulation temperature shall be a minimum of 120 degrees unless otherwise approved. Mop basins and specified kitchen fixtures shall receive 120 degree hot water.

E. Fixture Supplies:
    1. Locate rough-in for ADA water closets so that the handle is on the wide side of the stall.
    2. Urinals with 1.0 gpf flush valves shall be provided with 3/4” cold water supplies.

F. Science Lab Classrooms: Provide central water shut-off valves in teacher’s workstation casework to permit teacher control of water to all student sinks in the classroom.

G. Group shower mixing valve and shut off valves shall be installed in recessed locking wall cabinet.

3.4 INSULATION:

A. Storm: 1” thickness
    1. Drain basket
    2. Horizontal piping and first 2 feet in the vertical direction
    3. Ground floor level: five feet AFF

B. Domestic Water:
    1. Cold Water: 1” thickness.
    2. Hot Water: 1” and smaller piping: 1” thickness. 1-1/4” piping and larger: 1” thickness.
    3. Recirculating Hot Water: 1/2” thickness.
    4. Insulation shall be continuous over all plumbing valves. Provide valve handle extensions for all insulated valves.
    5. Fittings shall be covered with same thickness as piping with molded PVC jacket.
    6. Insulation for piping outdoors shall have aluminum jackets; seams at bottom of piping.

C. Handicapped Lavatories: Pre-molded trap and valve insulation shall be applied to supplies and drains below fixture.

3.5 GAS:

A. Provide dual gas pressure system. Medium press (2 lbs) for boilers, generators, and long runs to HVAC equipment and science applications; pressure regulators located at equipment; low press (7” WC) for hot water heater, science, and kitchen use.

B. Provide cocks, regulators, unions and test port at equipment connections.

C. All gas regulators shall be vented to outdoors; vent piping shall be shown on contract drawings.

D. Science Lab Classrooms: Provide key switch in teacher's workstation casework to permit teacher control of gas to all outlets in the classroom. Provide mushroom style push button at classroom exit for emergency gas shut down. Provide solenoid valve on gas service to classroom to shut off gas in response to emergency gas shut down; teacher's switch opens valve.

3.6 COORDINATION WITH OTHER DISCIPLINES/TRADES:

A. Plumbing engineer shall ensure that other disciplines are cognizant of these MCPS standards for fixtures and fittings being specified by them; i.e. laboratory fixtures and trim specified by the Architect, food service sinks specified by the Food Service Consultant, etc.

B. Coordinate with the other disciplines and clearly delineate the responsibilities of the plumbing contractor; i.e. rough-in for and make final connections to fixtures and fittings furnished and installed by others; rough-in for and install fittings furnished for fixtures provided by others; rough-in for and install fixtures and fittings furnished by others; etc.

C. Coordinate services with civil discipline; sizes, locations, and inverts are to be fixed no later than the 65% design review submission.

3.7 RADON VENTING:

A. Radon vent system shall be provided for every 5,000 sq.ft. of building slab. Individual vents shall be shown on contract drawing floor plans; installation per detail and to include mini magnehelic.

3.8 LEED REQUIREMENTS:

A. Recycle waste piping materials in accordance with Division 1 Construction Waste Management Requirements.

B. Provide a separate meter on any rainwater harvesting system.

3.9 INSTALLING ROOF DRAINS

A. The first fitting below the roof drain shall be a T without cleanout plug, except over food preparation and serving areas.

B. Set roof drains so flashing clamp ring is depressed below normal roof membrane level. Flashing of the roof drains shall be as specified in Division 7.

C. Sheet lead gaskets shall extend 12 inches (305 mm) beyond outer edge of roof drains and shall be secured with the flashing clamp.

D. Flashing clamp ring shall be embedded into the roofing and made watertight.

E. Ascertain that weep holes into drainage pans are open.

3.10 INSTALLING WATER HAMMER ARRESTERS (SHOCK ABSORBERS)

A. Install water hammer arresters in each branch domestic water pipe (hot and cold) which feeds either a battery of fixtures or a single fixtures with self closing faucet valves or flush valves.

B. Size and locate in the piping as shown on drawings and as recommended by the Plumbing and Drainage Institute.

3.11 INSTALLING SLEEVES

A. Install sleeves for piping, or piping with insulation continuous through sleeve, passing through walls, partitions, beams, or slabs. Sleeves through concrete floors shall be set prior to concrete pour.

a. Exception: Where steel pipe penetrates a steel beam that is not part of a fire-or smoke-rated assembly, no sleeve is required.

B. Do not cut, drill, or burn structural steel for installation of piping without specific instructions from the Architect.

C. Locations in nonfire-rated construction:

a. Install sleeves for penetrations of steel, iron, and insulated piping.

b. Install copper sleeves for penetrations of uninsulated copper tubing and piping.

c. Install plastic sleeves for penetrations of plastic piping. Plastic piping and sleeves are not permitted in ceiling spaces used as HVAC system plenums, nor in shafts used for building HVAC air distribution.

D. Locations in floors and fire-rated construction: Sleeves used in piping penetrations through fire-rated construction shall be an acceptable component of the through-penetration firestop assembly as specified in Section 15079 Firestopping for Mechanical Work.

a. Where firestop assembly is UL listed, sleeve material shall be as directed in the listing.

b. Where other specified approval and acceptance is required, sleeve shall be as described in the approved assembly.

E. Install Sleeves through walls and partitions flush with finished surfaces.

F. Sleeves through floors shall extend 0.375 inch (10 mm) above top of finished floor and be finished neat and level. Sleeves through mechanical or equipment room floors shall extend 2 inches above finished floor. Provide projecting sleeves with anchor clips to prevent them from being loosened and knocked down in the floor construction.

G. Sleeves for penetrations in kitchen and food service areas shall finish 0.375 inch (10 mm) above floor or flush with wall surfaces and be neatly pointed up to fit snuggly against floor or wall materials. Seal space between pipe and sleeve with waterproof sealant or fire barrier as required, and finish even with wall or floor with a light pouring of molten lead.

H. Sleeves for insulated piping with vapor barrier shall be large enough to pass piping and insulation.

I. Seal spaces between sleeves and pipe, or pipe insulation, in nonrated walls, with mineral wool. In rated walls or floors install required fire-rated caulk.

J. Penetrations in exterior masonry or concrete walls and foundations:

a. Sleeves: cast iron, or in cast concrete may be core drilled.

b. Above grade: Oakum and lead, or mechanical penetration seal, at outside face of wall.

c. Below grade: Mechanical penetration seals at outside and inside faces of wall. Link-seal or equal.

3.12 SCHEDULES

SYSTEM	TEST PRESSURE PSIG (kPa)	ALLOWABLE DROP	MEDIUM
Domestic water, cold & hot, and recirculated	125 (860)	None	Water
Heating water	125 (860)	None	Water
Chilled and chilled/heating water	125 (860)	None	Water
Sprinkler water and fire line	200 (1370)	None	Water
Air conditioning condensate drain	4.3 (30)	None	Water
Pumped storm	125 (860)	None	Water
Storm	4.3 (30)	None	Water
Fuel gas	100 (690)	None	*Nitrogen

END OF SECTION